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| 10/568,287 | 02/16/2006 | Takahiro Yamada | 040302-0548 | 3475 |
| 23428 7590 04/08/2009 FOLEY AND LARDNER LLP SUITE 500 3000 K STREET NW WASHINGTON, DC 20007 | | | | |
| EXAMINER | | | | |
| BARROW, AMANDA J | | | | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/568,287

Applicant(s)

YAMADA ET AL.

Examiner

AMANDA BARROW

Art Unit

4111

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 2/16/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-893)
Paper No(s)/Mail Date 2/16/06 and 9/8/06

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 10 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The claim recites that "the coolant is cooled by a running wind of the vehicle" which is not taught in the specification. Proper amendment is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-4, 10, 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaseki et al. (US Patent Application 2002/0037447 A1) (hereinafter "Imaseki").

Regarding claim 1, Imaseki teaches a cooling system for a fuel cell ("fuel cell temperature control apparatus") comprising a first circulating passage 11 ("a coolant circuit") that circulates and supplies cooling liquid into a fuel cell and also allows the cooling liquid to flow through a heat exchanger 3; a bypass line 11A ("a bypass circuit") that is connected to the first circulating passage 11 permitting the cooling liquid to bypass the heat exchanger 3; and a first circulating pump 12 located in the first circulating passage 11 between the fuel cell and the bypass line 11A allowing coolant to be circulated (paragraph 25; also see Figure 1). Imaseki does not specifically recite that cooling system is disposed in an "underfloor portion of a vehicle," that the heat exchanger is disposed in a motor room at a front portion of a vehicle, or that the bypass circuit and coolant pump are mounted in an "underfloor portion of the vehicle at a position rearward of the motor room." However, the layout taught by Imaseki and illustrated in Figure 1 makes it obvious to a person of ordinary skill in the art that these aforementioned parts are located in the positions claimed by the applicant.

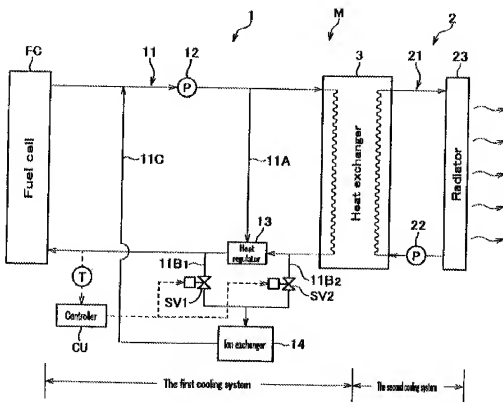
Regarding claim 2, Imaseki teaches that the cooling system for a fuel cell comprises an ion exchanger 14 for removing ions from the coolant (paragraph 52).

Regarding claim 3, Imaseki teaches that the ion exchanger 14 is connected to the bypass line 11A and therefore located in the "bypass circuit."

Regarding claim 4, Imaseki teaches that the ion exchanger 14 is disposed in a branch circuit branched off from the first circulating passage ("coolant circuit") at a discharge side of the

first circulating pump 12 ("coolant pump") and connected to the first circulating passage at an intake side of the first circulating pump. This is illustrated in Figure 1 below:

FIG. 1



Regarding claim 10, Imaseki teaches that the heat exchanger 3 includes a radiator 23 allowing the coolant to be cooled by the moving air of the vehicle (paragraphs 41 and 42; also see Figure 1).

Regarding claim 11, Imaseki teaches a heat regulator 13 ("intermediate heat exchanger") located between the radiator 23 and the fuel cell. Claim 11 is also rejected as being unpatentable over Imaseki in view of Ogawa (details in a later section).

Regarding claim 14, there are multiple instances of claim language invoking a 35 U.S.C. 112, sixth paragraph limitation (see MPEP 2181) due to means-plus-function language. Claim 14 recites, "circulation means for circulating coolant," which is defined in the specification as a coolant circuit (page 3, line 30 and page 4, lines 1-6). Claim 14 recites, "bypass means for bypassing the heat exchanger with respect to the coolant," which is defined in the specification as a bypass circuit (page 4, lines 7-10). Claim 14 recites, "pump means for pumping the coolant," which is defined in the specification as a coolant pump (page 4, lines 10-13).

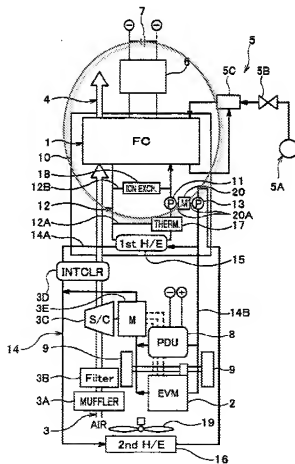
Regarding claim 14, Imaseki teaches a cooling system for a fuel cell ("fuel cell temperature control apparatus") comprising a first circulating passage 11 ("circulation means") that circulates and supplies cooling liquid into a fuel cell and also allows the cooling liquid to flow through a heat exchanger 3; a bypass line 11A ("bypass means") that is connected to the first circulating passage 11 permitting the cooling liquid to bypass the heat exchanger 3; and a first circulating pump 12 located in the first circulating passage 11 between the fuel cell and the bypass line 11A allowing coolant to be circulated (paragraph 25; also see Figure 1). Imaseki does not specifically recite that cooling system is disposed in an "underfloor portion of a vehicle," however, the layout taught by Imaseki and illustrated in Figure 1 makes it obvious to a person of ordinary skill in the art that the cooling system is located in the position claimed by the applicant.

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5. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaseki et al. (US Patent Application 2002/0037447 A1) as applied to claims 1-4, 10, 11 and 14 above, and further in view of Imaseki et al. (US Patent Application 2002/0061426 A1) (hereinafter "Imaseki 2") and Ogawa et al. (US Patent Application 2001/0050191 A1) (hereinafter "Ogawa").

Regarding claim 5, Ogawa shows that the ion exchanger 18 ("ion removal filter") is disposed in the primary circulation passage 12 ("coolant circuit"). This is illustrated in Figure 1:

FIG. 1



It would have been obvious to a person of ordinary skill in the art to adapt the placement of the ion exchanger of Ogawa to the cooling system of Imaseki as this allows for the conduits of the circulation passage to be shortened allowing for less coolant to be required (Ogawa – paragraph 37).

Regarding claim 6, Imaseki does not teach that the cooling system comprises a coolant reservoir tank; however, Imaseki 2 does teach a tank 15 containing coolant disposed in the primary coolant circulating path in the motor room (paragraphs 57-59). Imaseki 2 also teaches that part of the coolant circulating the circulating path is directed to an ion exchanger 103e and delivered to the tank 15 containing coolant (paragraph 112).

It would have been obvious to a person of ordinary skill in the art to combine the tank containing coolant ("coolant reservoir tank") of Imaseki 2 to the cooling system of Imaseki in order to provide a place for extra coolant to be held. A rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art. See *KSR International Co. v. Teleflex Inc.*, 550 U.S., 82 USPQ2d 1385, 1395 (2007) (see MPEP §§ 2143 and 2143.02).

6. Claims 7 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaseki et al. (US Patent Application 2002/0037447 A1) as applied to Claims 1-4, 10, 11 and 14 above, and further in view of Ogawa et al. (US Patent Application 2001/0050191 A1) (hereinafter "Ogawa").

Regarding claim 7, Imaseki fails to teach an air heat exchanger; however, Ogawa teaches a secondary heat exchanger 16 which is an air cooling type having an electric cooling fan 19 which circulates through the secondary circulation passage 14 with air flow created during traveling of the vehicle. The secondary heat exchanger 16 is disposed in the secondary circulation passage 14 ("the coolant circuit downstream of the bypass circuit"). This allows for heat exchange to be performed with the air to be supplied to the fuel cell (paragraphs 24-28).

It would have been obvious to a person of ordinary skill in the art to combine the air heat exchanger of Ogawa to the cooling system of Imaseki in order to provide cooled air to the fuel cell allowing for a more efficient and productive fuel cell system. A rationale to support a conclusion that a claim would have been obvious is shown above in the rejection of claim 6.

Regarding claim 11, Ogawa teaches a secondary heat exchanger 16 ("intermediate heat exchanger") disposed between the radiator and the fuel cell (paragraphs 6 and 24-28).

It would have been obvious to a person of ordinary skill in the art to combine the secondary heat exchanger of Ogawa to the cooling system of Imaseki in order to provide a more efficient means to cool the fuel cell while using minimal coolant. A rationale to support a conclusion that a claim would have been obvious is shown above in the rejection of claim 6.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imaseki et al. (US Patent Application 2002/0037447 A1) as applied to claims 1-4, 10, 11 and 14 above, and further in view of Imaseki et al. (US Patent Application 2002/0061426 A1) (hereinafter "Imaseki 2").

Regarding claim 8, Imaseki 2 teaches a humidifier 102a ("hydrogen heat exchanger") disposed in the coolant circuit upstream from the bypass circuit that is supplied with coolant to humidify the fuel gas supplied to the fuel cell by the high-pressure hydrogen source (paragraphs

102-112; also see Figures 1 and 5). Although the humidifier 102a is not labeled as a “heat exchanger,” it performs the same function as a heat exchanger by being provided with coolant in order to cool the hydrogen gas being supplied to the fuel cell.

It would have been obvious to a person of ordinary skill in the art to combine the humidifier 102a (“hydrogen heat exchanger”) of Imaseki 2 to the cooling system of Imaseki in order to provide the fuel cell with a cooler anode gas allowing for increased efficiency of the fuel cell. A rationale to support a conclusion that a claim would have been obvious is shown above in the rejection of claim 6.

8. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Imaseki et al. (US Patent Application 2002/0037447 A1) as applied to claims 1-4, 10, 11 and 14 above, and further in view of Micheli et al. (US Patent 5,449,568) (hereinafter “Micheli”).

Regarding claim 9, Imaseki fails to teach a combustor heat exchanger in the cooling system, however Micheli does teach this apparatus. As is illustrated in Figure 1, an indirect heat exchanger 22 (“combustor heat exchanger”) is in a circuit with a combustor 50 which combusts the exhaust hydrogen from the fuel cell 14 (columns 5-8).

It would have been obvious to a person of ordinary skill in the art to adapt the indirect heat exchanger of Micheli to the cooling system of Imaseki in order to make use of the heat produced from the exhaust providing for a more efficient system (Micheli, column 1, lines 6-60). The heat from the exhaust can also be used to provide a faster warm-up of the fuel cell as shown in Figure 1 as the exhaust is re-directed toward the fuel cell 14. Again, this is an example of combining prior art elements according to known methods to yield predictable results (see MPEP 2143).

9. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Imaseki et al. (US Patent Application 2002/0037447 A1) as applied to claims 1-4, 10, 11 and 14 above, and further in view of Shioya (US Patent Application 2002/0081468 A1).

Regarding claim 12, Imaseki fails to teach that the fuel cell is detachable, however, Shioya teaches that when a fuel cell is applied as the power supply system, that it can be readily removed from the device (paragraph 42). Shioya teaches that the fuel cell is configured to be attached or detached without restraint (paragraph 572).

It would be obvious to a person of ordinary skill in the art to adapt the arrangement of Shioya to the cooling system of Imaseki in order to easily remove the fuel cell for maintenance or if its life has expired thereby suppressing the cost (Shioya, paragraph 42). This is an example of combining prior art elements according to known methods to yield predictable results (see MPEP 2143). Also, making an old device portable is an obvious design. *In re Lindberg*, 93 USPQ 23 (CCPA 1952) (See MPEP § 2144.04).

Regarding claim 13, Shioya does not recite that a bypass circuit and coolant pump are mounted in the "accommodating member" or detachable portion; however, if one adapts the arrangement of Shioya to the cooling system of Imaseki as discussed in the rejection of claim 12, it would be obvious to a person of ordinary skill in the art to include the bypass circuit and coolant pump due to their proximity as this would yield predictable results. Also, making an old device portable is an obvious design. *In re Lindberg*, 93 USPQ 23 (CCPA 1952) (See MPEP § 2144.04).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AMANDA BARROW whose telephone number is (571)270-7867. The examiner can normally be reached on 7:30am-5pm EST. Monday-Friday, alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AMANDA BARROW/
Examiner, Art Unit 4111

/PATRICK RYAN/
Supervisory Patent Examiner, Art Unit 1795